What submesoscale processes matter in coastal environments?

Working Group 3 Chair: R. Ferrari

- surface mixed layer
  - surface fluxes
  - horizontal structure
  - Langmuir circulations
  - density driven shears
  - surface wave spectrum
  - convection
- transition layer at the base of the ML
- internal waves
- internal tides
- turbulence/finestructure – internal waves interactions
- benthic boundary layer
- topographic hydraulic effects (bottom form drag)
- submesoscale eddies
- river outflow

Rank in terms of relevance for synoptic prediction of T(x,y,z,t) and S(x,y,z,t)

- [surface fluxes]
- fluxes through the transition layer
- surface mixed layer
  - surface fluxes
  - horizontal structure
  - Langmuir circulations
  - surface waves internal waves
  - convection
- transition layer at the base of the ML
- river outflow
- submesoscale, subinertial eddies (100m < l < 10 km)
- internal waves
- internal tides
- turbulence – internal waves interactions
- benthic boundary layer
- topographic hydraulic effects

Rank in terms of relevance for synoptic prediction of currents

- [surface fluxes]
- fluxes through the transition layer
- surface mixed layer
  - surface fluxes
  - horizontal structure
  - Langmuir circulations
  - surface waves internal waves
  - convection
- benthic boundary layers
- internal tides
- internal waves
- topographic hydraulic effects
- river outflow
- submesoscale eddies and backscatter (100m < l < 10 km, subinertial)
- turbulence – internal waves interactions

What resolution do we need?

- The parameterization problems are the same at 10 km and 1 km resolution
- At 100 m, most of the horizontal structure is resolved
- With enough vertical resolution, we have parameterizations for internal wave mixing
- Shear dispersion at the surface is understood (an example of horizontal-vertical dynamics interactions), but parameterizations need observational validation

Resolution adequate for explicit simulations

- internal waves (100m, 10m)
- surface mixed layer (1km, 10m)
  - surface fluxes
  - horizontal structure
  - Langmuir circulations
  - density driven shears
  - surface wave spectrum
  - convection
- transition layer at the base of the ML (1km, 1m)
- turbulence/finestructure – internal waves interactions
- internal tides (100m, 10m)
- benthic boundary layer
- submesoscale eddies (100m < l < 10 km, subinertial)
- river outflows
- topographic hydraulic effects